Amendment to the Claims:

This listing of claims replaces all prior versions, and listings, of claims in the application:

1. (Original) A sensor, comprising;

a laser element, producing a diverging beam; and

a single substrate, including a first diffractive optical element placed to receive the diverging beam and produce a fringe based thereon, a scattering element which scatters said fringe beam based on particles being detected, and a second diffractive element receiving scattered light.

2. (Original) A sensor as in claim 1, wherein said single substrate includes a first surface which includes both said first and second diffractive optical elements.

3. (Original) A sensor as in claim 2, further comprising a second surface, opposite said first surface, including a pattern formed thereon which receives particles crossing the pattern, and light crossing the particles being collected as said scattered light.

4. (Original) A sensor as in claim 1, further comprising a detector, receiving said scattered light, and producing a signal indicative thereof.

5. (Original) A sensor as in claim 4, further comprising a housing, wherein said laser element, said single substrate, and said detector are coupled within said housing in a way which holds all of said elements in registration with one another.

6. (Original) A sensor as in claim 1, wherein said substrate is a substrate formed of a quartz.

7. (Original) A sensor as in claim 1, wherein said quartz substrate is less than a 1000 microns on each side.

8. (Original) A sensor as in claim 6, wherein said quartz substrate has a first surface with said first and second diffractive optical elements formed thereon and a second surface with diverging fringes which is placed in an area of light collection.

9. (Currently amended) A method of measuring particles, comprising:

placing a first surface of a transparent substrate into contact with a source of particles;

illuminating said particles with a laser ~~via a diffractive~~ optical element on a first surface of said substrate <u>to form interference fringes</u> and receiving scattered light from said particles via a second diffractive element on said first surface; and

monitoring said received light to determine information about said particles.

10. (Original) A method as in claim 9, wherein said diffractive elements are formed by depositing PMMA on the surface of the substrate.

11. (Original) A method as in claim 9, wherein said substrate is formed of quartz.

12. (Original) A method as in claim 9, further comprising forming alignment marks on opposite sides of the substrate.

13. (Currently amended) A method as in claim 12, wherein said alignment marks are formed as positive structures on one side, and lack of positive structures on the other side.

14. (Currently amended) An integrated shear stress sensor, comprising:

a housing;

a laser diode coupled to said housing in a location to emit light from a top of said housing;

a sensing element, formed by a transparent substrate, having a first surface adjacent said laser diode to receive illumination therefrom and a second surface adjacent a top portion of said housing to sense particle movement; ~~and~~

an optical sensor, also coupled to said housing, coupled adjacent to said substrate to receive collected light therefrom; and

optical slits on the second side of the substrate forming a fringe pattern in an area of said second side of said substrate, said fringe pattern interfering with said particles.

15. (Original) A sensor as in claim 14, wherein said first surface of said substrate includes two diffractive optical elements, a first optical element receiving said laser beam from

said laser beam, and a second of said optical elements receiving collected light.

16. (Original) A sensor as in claim 15, wherein said diffractive optical elements are formed from PMMA layers on the substrate.

17. (Cancelled)

18. (Original) A sensor as in claim 14, wherein said optical sensor includes an avalanche photodiode.

19. (Original) A method of sensing particles, comprising:

illuminating particles with a photodiode via a series of slits which form a fringe pattern; and

detecting interference with said fringe pattern as detecting particle flow.

20. (Original) A method as in claim 19 wherein said detecting comprises detecting shear stress.

21. (Original) A method as in claim 19, wherein said detecting comprises detecting particle size.

22. (Withdrawn) A method as in claim 19, wherein said illuminating comprises forming two beams, and recombining said two beams to form said fringe pattern.

23. (Withdrawn) A method as in claim 22, wherein said two beams are formed by a laser producing two output beams.

24. (Withdrawn) A method as in claim 22, wherein said two beams are formed by a single grating with a blocked part.

25. (Withdrawn) A method as in claim 19, wherein said detecting comprises detecting light in two locations, and determining a phase shift therebetween.

26. (Withdrawn) A method of determining particle size, comprising:

forming an output of a laser;

interfering said output of said laser along two separate paths with a third laser beam, at a location where said particle size is to be measured; and

using said interference to measure the size of the particle.

27. (Withdrawn) A method as in claim 26, wherein said using comprises detecting a phase shift between two separated receptors, which receive scattered light from said location.

28. (Withdrawn) A method as in claim 26, further comprising guiding the laser along two separate paths on a substrate;

forming a grating on the substrate which causes the laser to follow said paths; and

detecting a particle above said substrate based on interference caused by said grating.

29. (Withdrawn) A method as in claim 26, further comprising locating a plurality of photodetectors in respective locations where they can sense interference of said laser.

30. (Withdrawn) A sensor system comprising:

a substrate;

a laser, mounted on said substrate to produce two outputs;

gratings, located in said two directions, to modify said laser beam and produce another beam in a area of a particle whose characteristics are to be detected; and

a detector, using an interference between said two beams to determine said characteristics of said particle.

31. (Withdrawn) A system as in claim 30, wherein said laser produces outputs in two different directions.

32. (Withdrawn) A system as in claim 30, wherein said laser produces a single output which is separated.

33. (Withdrawn) A system as in claim 30, further comprising photodetectors, mounted on said substrate to detect scattered light therefrom.

34. (Withdrawn ) A system as in claim 30, further comprising photodetectors mounted above said substrate.

35. (Withdrawn) A particle sensor, comprising:

a semiconductor substrate;

a laser element, mounted on said semiconductor substrate, and producing at least one diverging beam;

a fringe producing element, producing a fringe in an area of a particle having characteristics to be measured; and

a detector, detecting scattered light from said fringe and said particles, and determining said characteristics of said particle from said scattered light.

36. ~~(Withdrawn) A sensor as in claim 35~~, further comprising a single substrate, including a diffractive optical element placed to receive the beam, a scattering element which scatters light from the beam based on particles being detected, and a second diffractive element receiving scattered light.

37. (Withdrawn) A system as in claim 4, further comprising a semiconductor substrate, and wherein said laser and said detector are on the same semiconductor.